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ON MARINE MOLLUSKS FROM THE PAMPEAN FORMATION.

IT is known that D'Orbigny considered the pampas as a marine formation, Burmeister as a fluvio-lacustrine deposit. In a paper on the Lagoa dos patos, in 1885, I referred to conditions which I considered important for the study of such formations as the Pampean. All discussions hitherto lay great stress on the absence of marine fossils in the Pampean mud. But this fact itself seems to rest partly on the belief of Burmeister that marine organisms are not to be found in the formation.

Burmeister (Descr. Phys. Rep. Arg. II., 1876, p. 177) having seen fragments of an *Astræa* found at a depth of two meters at San Nicolas, and believing that their presence was due to some disturbance of the beds, said that it is not possible to understand how they could have reached the locality where they were found.

Burmeister's view, above cited, will be essentially modified by the announcement which I am able to make of the following list of marine shells received by me from the distinguished Argentine paleontologist, Dr. Florentino Ameghino. The specimens are from the 'formacion pampeana, piso belgranense', near La Plata.

Purpura hæmastoma L.
Nassa polygona Orb.
Bullia deformis King.
Olivancillaria auricularia Lam.
Voluta brasiliana Sol.
Litorina flava King.
Litoridina australis Orb.
Crepidula fornicata? Lam.
Ostrea cristata Born.
Ostrea puelchana Orb.

Mytilus platensis Orb.

Mytilus exustus L (magellanicus Rve. fide Dall.).

Arca Martensii Recl.

Azara labiata Mat.

Tagelus gibbus Spgl. (platensis Orb.)

Mactra patagonica Orb.

*Mactra Dalli v. Iher. (M. Byronensis fide Dall).

†Mactra riograndensis v. Thes. (M. isabelleana Orb. fide v. Martens).

Cytherea rostrata Koch.

An otolith of a Sciænoid fish, Micropogon undulatus L., very common at Rio Grande do Sul, and probably also in the La Plata estuary.

All these mollusks are common species of the Atlantic coast of Uruguay and Argentina and most of them also from Rio Grande do Sul. Only three of them are of special interest, as not now found living in these latitudes.

Purpura hæmastoma L., still common on the coast at Rio Grande do Sul, is, I believe, not now known from the La Plata region. D'Orbigny, Petit and other authors have suggested that this species has been distributed through the agency of navigation. It is therefore important to note that it occurs fossil in America, as it does in the European Tertiary.

Litorina flava King, common from the West Indies to Santa Caterina, is not known to occur at Rio Grande do Sul.

Nassa polygona Orb. seems to have almost the same distribution as *Litorina flava*. I use D'Orbigny's name in default of the complete synonymy. Prof. von Martens considers it synonymous with *N. polygonata* Lam. Hidalgo, treating it in extenso (Moll. del viage al Pacifico, III., p. 39) regards it as being the same as *N. cinisculus* Reeve, with *antillarum* Dkr. and *sturnii* Phil. as varieties. So I prefer the name of D'Orbigny, as to the application of which there is no doubt.

These are, therefore, species once reaching to the 35° of south latitude, which now do not occur south of Santa Caterina or Rio Grande do Sul. It is quite possible that other species exist in the actual fauna which are dying out. For example, *Neritina meleagris* Lam., found at Santa Caterina. It occurs also in the bay of Paranagua, but only in one locality, though formerly it was much more common, being not rare in the shell mounds of the Sambaquis. Dunker (Jahrb. d. Deutsche mal. Ges. 1875, p. 245) says that *N. meleagris* is common at Montevideo, but this seems to be an error, as D'Orbigny, myself and others have not found the species in the La Plata region, either recent or fossil.

It was the opinion of Darwin, shared in part by Burmeister, that deep bays entered long distances into the interior during the Pampean formation, which for the most part is due to the action of winds and fresh water. To this I also agree. To such a gulf we owe the existence of the marine shells. The important facts discovered by Ameghino give a new turn to the discussion of the origin of the pampas

As Dall has shown that in Florida some of the Pampean mammals occur in beds covered by marine pliocene limestone, there cannot be any doubt that the pampean formation is in part of Pliocene age. It seemed that with the important study of Santiago Roth the pampas question might be considered as settled, but the facts here considered awaken doubts. It is quite possible that observations here brought together may be increased with time and more and more tend to modify the basis of our knowledge.

*This seems to me different from the Chilian form.

†A very common species on the coast at Rio Grande do Sul, but probably undescribed. Prof. von Martens named it *M. isabelleana* Orb., but this is a species with the beaks more inflated and the valves not so thick. Descriptions will be published elsewhere.

I am not aware of the distribution of *Astræa* and other corals south to Paranagua. It is quite possible that the *Astræa*, like the mollusks above mentioned, was a denizen of warmer water, demonstrating that the temperature of the Atlantic Ocean in this region has diminished since the Tertiary epoch.

Santiago Roth says that marine (Tertiary ?) shells also occur at Buenos Ayres at a considerable depth, and at other localities in the Pampean beds. The question is a difficult one, and only in the future may it be possible to fully appreciate such facts as are here put on record. The Argentine geologists have hitherto paid little attention to the study of the fossil mollusks, and for this reason this first contribution of Ameghino is encouraging and important.

H. VON IHERING.

MUSEO PAULISTA, SAN PAULO, BRAZIL.

USE OF THE INITIAL CAPITAL IN SPECIFIC NAMES OF PLANTS.

THE idea seems to prevail among some naturalists, as may be seen from a recent review in this journal (p. 162), that the retention of the initial capital in certain specific names of plants is a barbarous relic that the botanists themselves cannot honestly defend. As a matter of fact, this is very far from the truth, for it is almost universally adopted in botany, and for good and logical reasons. In the latest authoritative enumeration of American plants, namely, the *List of Pteridophyta and Spermatophyta*, there are four classes of specific names that are written with an initial capital: (1) Species named in honor of persons; (2) species named from places; (3) names of old genera, tribes or sections used as specific names; (4) substantives used as specific names.

The first case is based largely on sentiment. It, to the botanist, does not look well or dignified to write a person's name with a lower case initial. The name was given as an honor or monument to the person, and should be maintained as such. Not *Sedum torreyi*, *Plantago purshii*, but *S. Torreyi* and *P. Purshii*.

The second case is, perhaps, least defensible of all, yet it seems most natural and logical to give the name of a place as nearly as it is usually written, at least in English speaking countries. Thus, *Sambucus Canadensis* and *Campanula Americana*, rather than *S. canadensis* or *C. americana*.

The third case, namely the capitalization of specific names derived from old genera, tribes or sections, is in the highest degree valuable and condusive to accuracy. As names derived from these sources do not necessarily agree in case and number with the generic word, the initial capital calls attention to this, saves much trouble, and reduces the probability of error. *Campanula Medium*, for example, would half the time be changed into *Campanula Media*, but for the initial. So also with *Convolvulus Sepium*, *Achillea Millefolium*, *Delphinium Consolida Vaccinium Oxycoccus*, and hundreds of others that could be mentioned.

The ease with which words of this kind are changed is very well shown by the spelling of the name of the ruffed-grouse in the *Century Dictionary*. The correct name is *Bonasa Umbellus* and it is so printed in most places, but under the vocabulary word Bonasa it is *B. umbella*. This is, of course, quite a different thing, and simply shows that some unguided proof-reader, observing that the termination *us* did not agree with Bonasa, changed it.

The fourth case is much the same as the one just considered. Substantives do not necessarily agree with the generic word, and it is a matter of much convenience and information to write them with an initial capital, *e. g.*, *Ilex Dahoon*, *Gaultheria Shallon*. In this form they stand out in bold relief, while if the lower case was used there would be the constant tendency to make them harmonize in termination with the genus word.

The use or disuse of this capital initial may not be a matter of much importance, but if there were no rule upon it there would be lack of that uniformity which is so much to be desired. If left to personal choice, some writers would use it and others would not. The British Association Revised Code (1865), the code of the French Zoölogical Society and that of the International Zoölogical Congress leave the matter to individual preference. The code of nomenclature of the American Ornithologists' Union (canon viii.) expressly decides against capitals, although agreeing 'that it is a trivial matter.' The International Botanical Congress of 1867 and the committee of the American Association (1894) agree as to its adoption. Therefore, in addition to the above mentioned reasons, botanists write these classes of specific names with an initial capital for the sake of uniformity in botanical writings.

F. H. Knowlton.

DENSITY AND DIAMETER OF TERRESTRIAL PLANETS.

Recent determinations of the mass of Mercury have brought out a relation between the densities and diameters of the terrestrial planets which have not heretofore been thought possible on account of the supposed great density of Mercury.

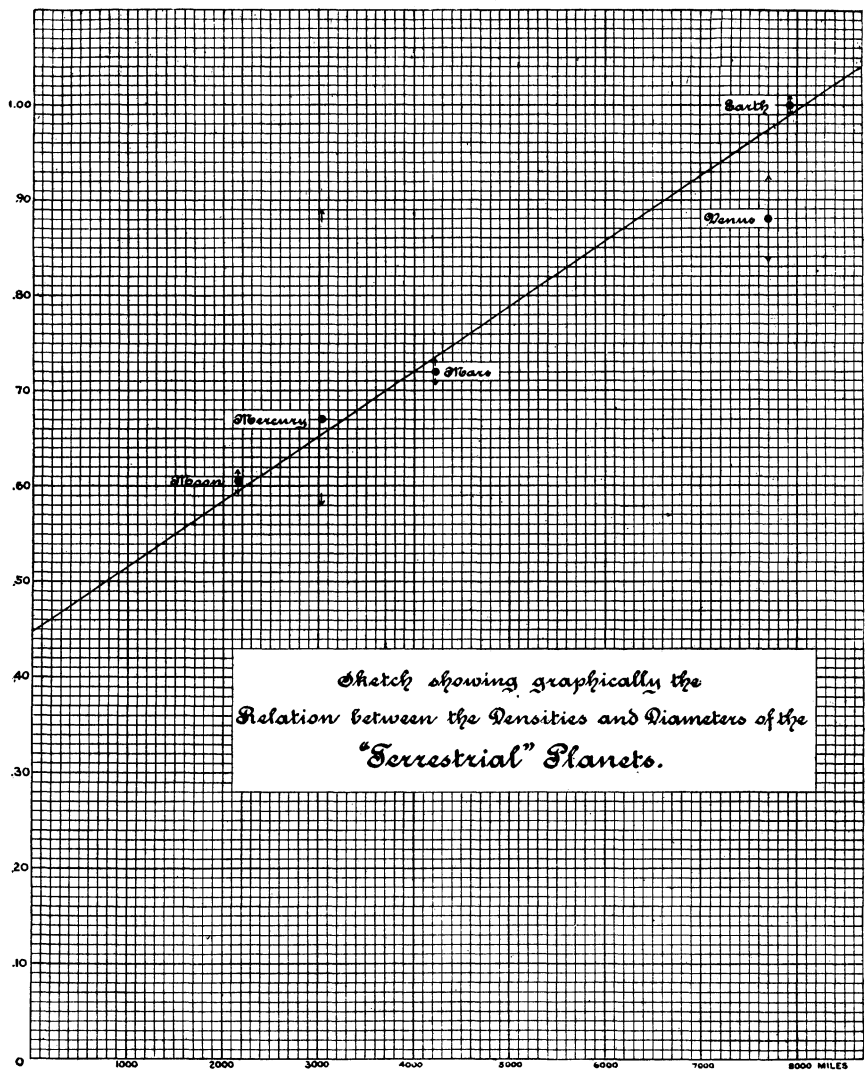
The accompanying sketch shows graphically this relation. The planets have been plotted with their diameters in miles as abscissa and their density, the earth as one, as ordinates. It is seen that these points lie approximately in a straight line. The data has been taken from Harkness' 'Solar Parallax' and Young's Astronomy. The masses from the former and the diameters from the latter, except that the density of Mercury is that lately announced by Backlund from a discussion of Encke's comet.

The probable error of the density has been obtained by combining the probable errors of the mass and diameter, and is shown in the sketch by the arrow-heads above and below the plotted points. It will be seen that the earth, Mars and the moon have much smaller probable errors than Mercury and Venus, since these latter have no known satellites to aid in determining their masses. If the most probable straight line be drawn with respect to the former, it will be as shown in the drawing. This line passes within the limits of the probable errors of all except Venus.

It will be observed that the straight line when prolonged to the left does not pass through the origin of coördinates, but cuts the ordinate at some distance above it. This indicates that a planet with a very small diameter would still have a considerable density. Meteroic stones of small diameter, when they reach the earth, do have a density about the same as that of terrestrial rocks, and this is about the density which is indicated in the drawing.

If this relation should prove to be the true law, then the mass of a terrestrial planet could be determined from its diameter. The mass of Venus so determined would be about one-tenth greater than as given. Venus is the only one of the five that is any more discrepant than might be expected from its probable error. The probable error of this planet as given may be too small. An increase of one-tenth in the mass, or a decrease of one-thirtieth in the diameter, would make Venus accordant. A sufficient increase in her mass would explain the movement in Mercury's perihelion. If the mass of Mercury proves to be as small as now supposed, that is about one-thirtieth that of the earth, it may explain some of his irregularities.

Prof. Young has pointed out that a body 200 miles in diameter near the sun would not be likely to be accidentally discovered, although it might be seen with some of the best instruments during transit across the



Sun's disc. It is, therefore, possible that Mercury may have an undiscovered satellite 200 miles in diameter. If so, and the satellite should be as far from Mercury as the moon is from the earth, it would take 150 days to make one complete revolution around the planet, or nearly twice as long as it takes Mercury to revolve about the sun. Such a satellite would have sufficient mass to cause Mercury to revolve in a secondary orbit 150 miles in diameter, which would be a measurable quantity.

E. S. WHEELER.

SAULT STE. MARIE, MICH.

THE DISTRIBUTION OF THE BLOW-GUN.

THE blow-gun is one of the most remarkable savage devices in which compressed air is used as a motive force. Primarily, the blow-gun is a simple tube of cane, smoothly

cleared of the joint septums, through which light darts feathered with a tuft of down, or pieces of pith, are propelled by the breath.

The blow-gun is used for killing birds and small mammals. Frequently the arrows are poisoned, rendering the light dart effective on larger game. The chief merit of the blow-gun is its accuracy and the silence with which it may be employed.

The penetration of the blow-gun dart is greater than would be imagined. At the distance of 50 feet I have driven a blunt dart one-quarter of an inch into a pine plank. It is stated that the range of the blow-gun among some tribes is from 80 to 100 yards.

Apropos to Professor Mason's paper connecting the Eastern Asiatics with the Americans along a great natural migration line, the distribution of the blow-gun may be interesting.

The blow-gun is a tropical or sub-tropical device, and may be looked for in regions where bamboo or cane grows. Nevertheless these tubes are often made of hard wood, single, or of two excavated pieces joined together, and frequently one tube is thrust inside of another to secure rigidity. The examination of many of these blow-guns inspires a great respect for the ingenuity and mechanical skill of the workers.

The curious fact of distribution, however, is that the Malays and American aborigines alone use the blow-gun. The Malay specimens of the blow-gun existing in the National Museum are from the Dyaks of Borneo, the Javanese, the Kyans of Burma and the Johore people from the Malay peninsula. The literature also supplies other Malay localities.

The North American specimens are from the Chetimachas of Louisiana, who frequently combine the tubes in series, forming a compound blow-gun and the Cherokees of the Carolinas. From Central Amercia, the Indians of Honduras and Costa Rica; from South America, several Amazon tribes from Equador east and from British Guiana employ the blow-gun. Walter Hough.

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*PSYCHOLOGY.**

Psychology, as we all know, is the 'science of mind.' But such a definition does little more than raise the question, What is mind? We cannot take mind for granted, for it is the very thing that psychology has to investigate. And yet, although 'mind' is one of those words which it is impossible to define, everyone is able to attach some sort of meaning to it. What do you yourselves mean when you talk of your 'mind?' You mean, probably, some particular group or set of your internal experiences; some tangle or other of feelings, thoughts, desires, resolutions, ideas, wishes, hopes, actions, emotions, impulses, expectations, memories. There are plenty of words, expressing different 'sides' of mind, as they are called. Mind, then, is the sum total of all these experiences—of all these processes. There is no mind beyond them; the term is simply the collective name of all such processes as those which I have enumerated.

I said, however, that when you talk, in an everyday way, of your 'mind,' you probably refer to some special set or group of these experiences. When you say, "I cannot make up my mind whether to do it or not," you mean that you cannot make up your present mind. Now here the psychologist makes a distinction. We use the term 'consciousness' to express the mind of the present moment. Thus if I were to ask you to tell me something of your experiences just now, I should say to you: "Look into your consciousness, and see whether so-and-so is taking place or not." Or, again, if I were to analyze for you your present state of mind—to try and imagine what is going

* A lecture delivered to the Class in General Philosophy (Introductory) in Cornell University, December, 1894.

on inside of you as you listen to me—I should speak technically of analyzing your consciousness. Consciousness is the mind at any moment. Mind, therefore, is the sum-total of consciousnesses experienced in the lifetime of the individual. You have one mind, extending (I hope) over seventy full years; but the mind upon which you experiment at any given moment for psychological purposes—or the mind which you make up at a given moment—is called your consciousness. So that psychology, while it is the science of mind, in the sense that it deals with all the mental experiences of a man, from the time of his birth to the time of his death, deals in any special hour, during any special enquiry, with the phenomena of consciousness.

But consciousness—as the number of words in my catalogue of a moment ago sufficiently indicated—is a very intricate, complex and tangled matter. If we are to examine it at all carefully, we must try, first of all, to get some sort of order into its phenomena. Let us begin the attempt at once of describing our internal experiences, as accurately as possible.

We notice, at the outset, that we are to a large extent at the mercy of our surroundings, of things outside of us. We are not free to see what we like, to hear what we like, to touch what we like; what we see and hear and touch is all determined for us, by the physical nature of the bodies from which impressions come. You can understand, of course, that this is true in the simple instances that I have given; but I want to prove to you that it is true of a very large part, indeed, of our mental experience. Put down in the first place (1) sensations and perceptions. Every time that one of our sense-organs is excited, is put in action, that is done by means of something in the external world. An ether-vibration makes us see; an air-vibration makes us hear or smell, and so on. Those are sensations. And perceptions only differ from sensations in being more complicated. Thus in the sphere of sight, you perceive a house or a tree; in the sphere of hearing you perceive a musical harmony or a musical discord; in the sphere of touch you perceive that a complex of impressions is a piece of wood, or a piece of wire, or what not. The tree and the house are compound impressions, containing many colors and many shapes; the musical chord is a compound of three or four or more simple tones, and so on. All this, very obviously, comes from the outside world. So, too, does (2) memory. You cannot remember what has not happened. If you try to remember a name, you try to recover a lost perception—the perception of the spoken word. If you try to remember a picture, you are attempting to recover a lost visual perception. It is for this reason that the psychologist distinguishes kinds or types of memory—the visual, the auditory and the motor. People who can play chess blindfold have the visual memory very highly developed. They do not, perhaps, see every piece in their mind's eye, but they see the board as a whole, and know where each piece upon it is. Most 'extempore' speakers, too, rely upon their visual memory. There is comparatively little true extempore speaking done. Of course, if a man is thoroughly familiar with his subject, or is speaking under the influence of strong emotion, he may be able to address an audience without preparation. But most of us who speak 'without notes' do so by the aid of our visual memory; we see what we have written, mentally, paragraph by paragraph, and when our eyes are on our hearers, are really reading from a memory manuscript. Instances of good auditory memory, again, are furnished by those fortunate persons who can recall accurately the airs of an opera that they have only once heard. And people who play the piano

'by ear' play by finger-memory; their memories are muscular or motor. All these memories, then, depend upon the external world. So (3) does imagination. Imagination can put perceptions together in new or unusual ways; but it can never make a new perception. Try to imagine a color which is different from all the colors that are known. You cannot do it. You may imagine mixtures of colors, hues and tints obtained from combinations of the known colors, which you have never actually seen; but you cannot imagine a new color. The same fact comes out in works of fiction. When Baron Munchausen takes you to the moon or the dog-star, and shows you their inhabitants; and when Peter Wilkins describes to you the population of the South Pole—these people are simply human beings, with their characters changed and modified in various ways. They can take their eyes out of their heads and pass them round to their neighbors, or they have wings which fold around them and serve as clothing; but there is nothing new in all this. It is only the putting of the perceptions together that is new, not the perceptions themselves. And the same is true of all the constructions of the imagination, as they are called, devils, centaurs, sea-serpents, dragons, hippogriffs, ghosts and the rest of them.

The world outside of us, then, is responsible for a good deal of our mental furniture. We can simplify matters, here, for purposes of classification, by grouping together sensation, perception, memory-image and imaginary representation, as 'ideas.' Sensation is the raw material from which ideas are built up. As for the other usages: if you cannot remember, you say 'I haven't any idea of what that man's name was;' and if you are endeavoring to imagine a circumstance, you say 'I haven't any idea of how that could have happened.'

So much for the first principal category of mental experience. Now, in the second place, we are in some respects not at the mercy of the world outside, but the world is at our mercy. What is the great difference between the animal and the plant? Surely this, that the animal can move at will, while the plant is stationary. That seems to be a very simple matter; but just consider how much it means. If the plant is going to lead a stationary life, it can take advantage of the fact—I speak metaphorically, of course—to be careless of its shape and size; or rather, it must make itself as big and as complicated as it can, in order to secure all the nourishment possible from one settled spot. The result is that the plant carries its lungs and its digestive apparatus all over it, on the outside. You know the functions of leaves and roots. With the animal the reverse is the case. It is going to move about. It can seek food in different places. The best thing for it, therefore, is to have its lungs and digestive organs packed away inside of it; so that it can get about with as light a weight to carry, and as convenient a balance of that weight, as possible. There must be no loose ends left on the outside, injury to which would mean inefficiency or death. Well! You see that, by moving among things at its own will and pleasure the animal has a certain power over the external world. How is this power represented in consciousness? In two principal ways: (1) Whenever we move; or, to put the matter more technically, and more definitely with reference to ourselves as distinct from the lower animals, whenever we act, we have in consciousness the experience of effort, of endeavor. This is an experience quite different from the experience that comes to us as ideas. We can have, naturally, an idea of effort; that would be the idea of some person making the effort, or the idea of some obstacle to be overcome by effort, or what not. But

besides the idea of effort, we experience effort itself. That is one of the hardest points in psychology to have made clear to you, or to make clear to yourselves. This instance may help you: You know that we speak of one man as having more 'go' in him than his neighbor, without implying by the phrase that he has more ideas. There are many names for the effort-experience. Some psychologists speak of it as the experience of spontaneity, of one's own initiative; others of an activity in cousciousness. 'Effort' is at once the most concrete and, I think, the most intelligible word. (2) Our power over the world outside, again, is manifested in another way —by the phenomena of attention. Not every process among our physical surroundings has us at its mercy in the same degree. We are exposed to all manner of impressions; but they are not all alike powerful to affect our consciousness. Think of your own state of mind now. You have presented to you a certain number of visual impressions—the room, its furniture, the people about you. You are subject to certain temperature sensations; to certain pressures, from your clothing; to certain organic sensations, hunger or satiety. Each of you has a large stock of memories, ready to crowd into consciousness if they are allowed to. Each of you, again, has the day's programme in his mind; he can imagine what will be done between now and bed-time; and this train of ideas of the imagination is ready to sweep across his mind, if free play is given to it. But all this medley of conflicting influences you are able, if you like, to neglect. You can just brush them aside, by attending to the single series of auditory impressions that is affecting you, to the succession of words which I am speaking. When the whole of your surroundings is pressing in upon you through the avenues of the sense-organs, clamoring for notice, you have the power of choosing which shall be let in at the door of consciousness. Only those facts cross the threshold to which you desire to attend.

"But," you may say, "suppose that this is true, what has attention to do with movement? You told us that it was movement that distinguished the animal from the plant, and that along with movement went power over the external world. Now what has movement to do with attention?" That is a perfectly fair question, but one which I cannot here answer for you in detail. To understand the fact of the connection thoroughly—and the connection is a fact—you must have studied psychology. But I can give you a pair of statements which will be better than nothing. The first is this: Whenever we attend, we move. I do not mean that the whole body moves, that there is locomotion: but that there is movement,—movement in the eye, movement in the ear, movement in the scalp, movement somewhere. And the second is this: It is the moving thing that attracts the attention. You cannot attend to one single thing, one really single thing, for more than a few seconds together. Either you go to sleep, or you go into hysterics. On the other hand, one is almost constrained to attend to anything that moves. You can hear the single voice that carries the melody, when there is an orchestra of half-a-hundred instruments thundering on at the same time, because the melody changes, the tones move; while the accompaniment is relatively stationary. So that attention to the melody is easy. If any of you have been out shooting after dark, you will know that one tells the game by its movement. So long as it is still, it is safe. But let it move, and though the eyes have been looking in a quite wrong direction, the attention is drawn upon it by force, as it were; one cannot help seeing it.

Those, then, are two categories of mental

experience. There is one more to mention. This self of ours, this 'I,' which is exposed to the physical changes in the world in part, and in part helps to bring about physical changes in the world by moving to and fro in it, is not indifferent to what goes on in either case. It does not just have ideas, on the one hand; and attend to them or move in consequence of them, on the other. It does more; it feels. It feels when impressions come in; it feels when efforts go out. So that alongside of ideas and efforts must come a third category of mental experience—feelings. Feeling is of two kinds, pleasurable and painful. It is quite distinct in consciousness from ideation, and from effort and attention. That is another of the points which arise at the very beginnings of a study of psychology that it is extremely difficult to get clear about—that pleasure and pain, as such, belong to an entirely different order of processes from the processes which we call collectively ideas. But it is a fact, despite the intimate interconnection of the two in our concrete experience. Let me try to drive it home for you by two illustrations. You cannot remember a pleasure or pain. When you try to recall the pain of a flogging that you had at school, what you recall is really only the complex of perceptions, not the pain itself. You remember all the circumstances—your being sentenced, the people standing round you, the room in which the fatal event took place, the master who did the deed. All these are ideas. But so far are you from being able to remember the actual pain of the flogging that the memory of the circumstances to-day may be actually pleasant; you smile as you look back on them. That is the first illustration; the second is this: You cannot attend to a pleasure or pain as such. It is a common saying that if you attend to a toothache, for instance, you 'make it worse.' That is bad psychology. You attend, in reality, to the tooth. That means that you perceive the tooth more clearly than anything else for the time being; your idea of the tooth is the very strongest in consciousness. But by attending to the idea and so making it clearer, the feeling that goes along with the idea is made clearer, too. So the pain 'gets worse,' not because you attended to it, but because you attended to the group of perceptions with which it was connected.

Now, then, we have got our raw material into something like order. Consciousness, instead of being a shapeless tangle and maze of various intertwined and interwoven processes—as it appeared to us to be when we started out on our enquiry—has proved to be capable of arrangement and simplification. You may, it is true, raise the objection that our table of contents is, perhaps, not inclusive of every known mental state. Where, you may ask, is emotion; where is expectation; where are all the rest of the familiar terms for mental experiences? Well, you must take my word for it, that all these other states of mind or mental experiences can be derived from the three simple processes which I have named to you. If you were to work through a psychology, you would find that there was nothing treated of, in any chapter of it, which was not a compound of these three sets of elements—ideas, feelings and efforts—mixed in different proportions. And that being the case, it is these three elements with which psychology begins. She first of all describes them, as minutely and accurately as possible; and then furnishes a theory or an explanation of them, in the sense that she gives the conditions, bodily and mental, of their appearance in consciousness. Under what conditions do we have this and this perception? Under what conditions do we remember and imagine? Under what conditions do we feel so and so, attend

to this and that? These are the questions that come up for answer.

Into those questions we cannot here enter. Let it be sufficient for you, in this lecture, to have learned the names and characters of the simplest items of mental experience—of those items which are always and invariably present in our concrete, every-day experiences. Draw for yourselves an outline map of mind. You must make three countries, as it were, within that map. Ideas must go in in one color to the right; efforts in another to the left; and feelings will lie in the middle between the two. And you must suppose that each of these three territories has an independent government; but that their governments are very friendly, and often take joint action—indeed, that they hardly ever think of taking action of themselves. Especially must you conceive that both idea and effort have right of way through any part of the dominion of feeling; and that the communications are so open, and the relations so close, that scarcely anything can affect idea or effort, from the outside or from the inside, that does not also exert an effect upon feeling. The detailed survey of the three territories, and the laying down of roads through them for the student to follow—that is the further business of Psychology. E. B. TITCHENER.

LOSS OF PROFESSOR MILNE'S SEISMOLOGICAL APPARATUS, LIBRARY AND COLLECTION.

EVERY one interested in Seismology knows of the great work done by Professor John Milne, F. R. S., during a residence of nearly a quarter of a century in Japan, which country became, a decade ago, the earthquake lahoratory of the world. Through his interest, and that which he kindled in other foreign residents, the Seismological Society of Japan was organized about fifteen years ago. During its active existence its Annual Reports contained the most important contributions to Seismology anywhere published, and it is not too much to say that the work of this Society amounted to a revolution in the methods of observation and research. To its Transactions, Professor Milne was by far the largest contributor. When the rapid decrease of the number of foreign scientific men resident in Japan threatened the life of the Society, he tactfully enlisted the support and cooperation of the Japanese. The issue, by the University, of an extensive and valuable series of scientific memoirs, tended, naturally, to divert much of the active interest which they for a time manifested, and a few years ago the publication of the Transactions of the Seismological Society ceased. Professor Milne was not discouraged however, and at his own risk and expense at once substituted a periodical which he called the 'Seismological Journal,' which he has continued to issue at great pecuniary loss and which contains many valuable and important contributions to the science.

During all of these years, with a tireless and inexhaustible industry and a rare ingenuity of design and wealth of mechanical resource, he had invented, constructed and put into use a variety of earthquake detectors, recorders, measurers, wave and tremor registers and even earthquake 'avoiders' or 'nullifiers,' which, with the numerous devices and inventions of other foreign students of Seismology in Japan, the value of which he was quick to recognize and utilize, constituted a collection the like of which never existed before. Besides these instrumental appliances Professor Milne had accumulated an extensive and valuable library of Seismology, including many early and rare pamphlets and volumes and almost everything published on the subject during the past fifteen years.

His connection with the Japanese Government is shortly to terminate, and he had

prepared a complete equipment for an observatory to be set up in England on his return to that country, by means of which he hoped to show that earthquakes travel around the globe, and to be able to study them there.

Those who have been aware of all these facts, and all who are now made aware of them for the first time, will, I am sure, experience a feeling of great regret on learning of the destruction by fire on February 17th of practically all of these valuable accumulations of years of labor, together with personal effects of great interest and value to Professor Milne.

The observatory in which these things were, and which is now gone forever, was also an object of much interest in its relation to the educational development of Japan during the past twenty years. It was erected nearly that many years ago, a little before the close of Dr. Murray's connection with the Department of Education. It contained in the beginning a good but small Equatorial by Alvan Clark and a Transit. One end of it was used as a meteorological observatory under the direction of the writer during several years, being equipped with a good collection of self-registering instruments obtained mostly from London, the results of the use of which were published as Annual Scientific Memoirs by the authorities of the University. The transit wing was utilized by Professor W. S. Chaplin in his courses in Civil Engineering, until the Astronomical part of it was placed in the hands of Professor H. M. Paul, who served the University as Professor of Astronomy for several years, beginning in 1880. When a few years later the Engineering College became an integral part of the University and the whole was located in the Kaga Yashiki, the observatory was turned over to Professor Milne, an addition to it was built and he made a Seismological 'Laboratory and Bazaar' out of it, residing in a part of it. It was a comfortable bungalow sort of a structure, located in the Kaga Yashiki, just in the rear of the row of dwellings where, fifteen years ago, lived, beginning at the entrance to the Compound, Fenollosa, Mendenhall, Braun, Cooper, Morse, Chaplin, Ewing and Atkinson, all Professors in the University and exhibiting a mixture of American, Spanish, German, English and Scotch blood which illustrates the disposition of the young-old nation to get what it wants wherever it thinks it can find it. When it became the home of Professor Milne it became the source of a delightful hospitality which many 'globe trotters' of all lands have enjoyed, and thousands besides his scientific friends will sympathize with him in his great loss.

In a recent letter from Professor Milne he says:

"Just now you and Paul may be breathing all that is left of the old observatory and my belongings."

He sends me a characteristic and graphic account of the occurrence, 'prepared,' he says, 'for maiden aunts and relatives,' from which the following extract will, I am sure, be of interest to all readers:

"As nearly all the transactions of the Seismological Society were packed up to go to Europe, a few that had middle places in the boxes may be saved, but I doubt if even out of 2500 copies I shall get more than two or three hundred. All my old earthquake books, some of which even dated from 1500 to 1600, but which were perhaps more curious than useful, seem to have gone. One function they had was to inspire the globe trotter, or travelling clergyman, with respect for a science that was apparently so ancient. Amongst them there was a poem called 'the earthquake,' A. D. 1750, but I know that by heart. The new books were volumes of bound pamphlets in all sorts of languages which I had slashed out of the publications of all sorts of societies. Perhaps the burning of them was a visitation for my Goth-like behaviour.

Instruments were fused or vaporized. Sixteen specially constructed clocks which would turn drums once a day, once a week, or drive a band of paper for two years, together with seismographs and horizontal pendulums, self-recording thermometers and barome-

ters, microscopes, and a museum of old and new contrivances are now in the scrap heap. Until to-day, I felt I had the observatory I intended to put up in England completely furnished, and I was proud of the furniture.

One very cruel cut was the picking up of an insurance policy dated 1878, which fluttered out of the ruins. One reason that I have not insured for some years past is because day and night I always had for purposes of continuous photography open benzine lamps burning in my house, and I should have had to tell the agent about the little tricks they played when first I used them. It may sound odd, but I do not think a stranger to their ways can light one so that nothing shall happen during the next three days. Against eccentricities like these I insured myself by having above them a bunch of fluffy paper, which, if the lamp blazed up, was burned and burned its suspended string. This was followed by the falling of a lever, when an electric bell in my bedroom and one in the kitchen was set going.

Outside the door of the instrument room stood fire-extinguishers and a heap of rugs. From time to time I had 'fire drill,' going through the operation of turning up a lamp, burning the paper, ringing the bells, alarming everybody, and then putting out the conflagration—in fact, very much like what happens on ship-board, only I had real fire—which was easily extinguished.

But what happened was the unexpected; the fire broke out in the midst of a pile of wood in an outhouse, and this, with a nice wind blowing, on a Sunday morning, when there was no one near to help.

And now I have next to nothing—decorations, medals, diplomas, clothes, manuscripts, extending over twenty-five years, and everything else has gone up in smoke; still it is not altogether a misfortune.

I shall not have a sale, nor the worry of selecting amongst my accumulations; there will be no buying boxes and packing up, neither will there be any haggling with custom house officials, or trouble in collecting on an insurance policy. On the other hand, I shall have new clothes, and some time or other, I hope, new clocks and new instrumeuts, whilst what I have got is the knowledge that I have many sincere and kind friends. Their clothes don't fit, but the sympathy that they have expressed and the little things they have sent me tells me that I should never be homeless in Japan. Looked at in the right way; like an earthquake, a fire may, after all, be a blessing in disguise, but, of course, it is sometimes pretty well wrapped up.

Dies iræ, dies illa,
Solvet sæclum in favilla."

Professor Milne asks me to make public the loss of his address book and his desire to send to all to whom it may be due, copies of Vol. IV. of the 'Seismological Journal.' This, he says, is an unusually large number, and he hopes an unusually valuable contribution to Seismology—his 'expiring effort;' and he asks all to whom this volume should be sent to address him, care Japan Mail Office, Yokohama.

Out of the few hundred copies, more or less, of the Transactions of the Seismological Society of Japan, he will be able to make up some sets; and those desiring to obtain them should address him, care Geological Society, Burlington House, London. And finally, he earnestly desires to receive, in exchange or otherwise, copies of any papers on or relating to earthquakes, volcanoes, or earth movements in general.

I am sure that every one who can will respond to this last appeal and cheerfully do whatever is possible to assist Professor Milne to replace, as far as may be, the accumulations of a quarter of a century, converted into sunset-reddening dust in a few short moments. T. C. M.

CORRESPONDENCE.

THE IDEAL INDEX TO SCIENTIFIC LITERATURE.

TO THE EDITOR OF SCIENCE: Since you have been so kind as to ask me to contribute to SCIENCE my views as to how the plan of cataloguing scientific literature may best be accomplished, I venture to present the following considerations. It is probable that some of the ideas suggested are impracticable, and indeed that the plan is too extensive and unwieldly to be undertaken as a whole at the present time. The literature of science is so vast and the number of workers so great, the degree of specialization in modern work so intense and the participation in research so wide-spread over the world, that a really adequate and

serviceable index must, of necessity, be of great extent, and undertaken upon a scale of considerable magnificence.

It may be that the time has not yet come when the scientific men of all the world can coöperate together in such a task as this, but if coöperation is possible in any field of intellectual activity, surely it is in that of science. Such coöperation is not only essential to thorough work in indexing, but would also have a most important influence in promoting united efforts in other branches of scientific activity.

The considerations suggested are these:

1. The catalogue should be international in name and scope. This is essential in order to secure the unreserved support of all nations engaged in the production of scientific literature. It should, therefore, not bear the imprint of any society or organization, or derive its distinctive character from any one nation. Since the titles will, of necessity, be quoted exactly, it might be well that all annotations and comments should be in the same language as the title. To insist that only English or French should be used would be fatal to its general adoption by other countries. Titles in the Scandinavian, Slavonic and Oriental Languages and dialects and others would, however, need to be translated into French, German or English.

2. It should be exhaustive within its own limits, no latitude being given to the judgment and taste of its editors, in the matter of rejecting titles.

3. It should be printed in annual installments, each installment including every paper or work printed within a single year, and each installment should be published in not more than six (preferably not more than three) months after the close of the year.

4. The publication should be in the form of a bibliographical catalogue, with the titles arranged alphabetically by authors, the papers by each author to be numbered, beginning with number one. This would render it possible to identify any paper, either in an annual or a general index, by simple reference to author, year and number.

In recommending that the catalogue shall be published in book form, I am by no means unmindful of the merits of the card-catalogue system in work of this kind. I use card-catalogues freely in my own work, and in the National Museum there are hundreds of thousands of cards by means of which the vast collections of specimens and papers are kept under control. The card-index has its limitations, however, and these are nowhere more evident than in connection with such a scheme as a universal scientific catalogue.

The very bulk and unwieldiness of the card system is an objection, which may be partly appreciated if one can imagine the contents of the ten volumes of the Royal Society's Catalogue transformed into card form and arranged in drawers.*

In the volumes as they now stand, the eye can sweep rapidly over page after page in search of a given title, and thirty or forty impressions pass to the mind at a glance, instead of one, while the strain upon the attention caused by turning over the pages is much less than where each title card is scrutinized singly.

For finding a book or reference when the name of the author or its title is known, the card system is without rival. It is less useful, however, when, as often happens, one is 'looking up' a subject in a general way. A card-catalogue, after it has attained to great bulk, requires much labor

* Dr. Carrington Bolton prepared the copy for his 'Select Bibliography of Chemistry' on slips of standard sizes, and it filled 7 standard trays or a length of nearly 9 feet. The slips were on thin paper —if they had been of card the lengths would have been nearly 20 feet. When printed the 12,000 titles were presented in a light convenient octavo volume of about 1,200 pages.

in consultation and a vast amount of painstaking care to insert new cards and keep it in order. Then, too, one of its features which makes it particularly advantageous in the hands of an individual scholar, is that the cards may be continually sorted and rearranged. This would be practically impossible with a great card index intended for the use of many in a public institution. Volumes like those of the Royal Society index may be carried to the desk of the student. A card-catalogue he must consult in its place of deposit, probably in a crowded and noisy library. Then, too, after a period of years the card index will represent the investment of hundreds and soon of thousands of dollars, on the part of each possessor, and the tendency will be to place constantly narrowing restrictions upon its use.

The needs of library workers might be met in part by printing a special edition of the catalogue on one side of the page, so that the titles might be cut and pasted upon cards.* Indeed, if there were a sufficient demand, a special edition of the catalogue might be printed on cards. Whatever may be said of the advantages of the card system, it is certain that it would not be accepted in Europe.

Every one remembers the plan of Jewett, who, in the early days of the Smithsonian Institution, proposed a universal bibliography. His plan was to electrotype each title upon a separate block, and to supply these blocks, either for printing cards, or to be made up into catalogues in any system of arrangement desired. His project almost succeeded fifty years ago, when there was much less demand, much less money, and much more in the way of mechanical obstacles, than at present. The modern type-setting machine, which casts each line of type in a single bar, would lend itself admirably to such co-operative work.

5. A subject-index of the most exhaustive character should be issued in connection with each annual publication, but since this index cannot so conveniently be made until the catalogue itself has been set in type, it might be well not to delay the distribution of the catalogue itself until the index is ready, but cause the latter to follow as soon as practicable.

6. The adoption of this index as a part of the plan would render it practicable to issue the entire record of the year's work in one single alphabetical series, if this were deemed desirable. It might be, however, that it would be more convenient, and less expensive to subscribers interested in special branches of science, if the titles were arranged in more than one series. To divide it into two—one for the physical and one for the natural sciences—would be quite practicable; perhaps philology, history, economics and mechanical science might each have a volume of its own. Whether further subdivision would answer, is a question for careful discussion.

7. The catalogue should embrace within its determined scope all publications in the following categories:

(a). Publications of scientific academies and societies.

(b). Scientific publications of universities, colleges, and technical schools.

(c). Publications of scientific expeditions.

(d). Scientific publications of national, municipal and other governments.

* In order to facilitate this, the name of the author might well be printed in bold-faced type, and *repeated at the beginning of each title.* This increases the cost but little, and adds much to the usefulness of the bibliography, if it is to be cut up and rearranged, either for a catalogue, as I have suggested, or as 'copy' for other bibliographies. The width of the title as printed should not exceed 4½ inches, whether the publication is in octavo form or larger. It will then come within the limits of the standard cards.

(e) Independently published scientific books of reputable character.

(f) All articles in journals and magazines devoted exclusively to the sciences.*

(g) Articles of scientific importance in the general periodical literature of the day, and in the cyclopædias and works of reference, at the discretion of the editorial committees.

(h) All bibliographical publications, relating wholly or in part to scientific literature, including important library catalogues, etc.†

(i) All authors-separates or offprints with independent titles and paging. (Including even scientific addresses and special papers in ephemeral journals, when practicable.)

(k) *Festschriften:* Memorial works and others, coöperative volumes, these to be analyzed and indexed as periodicals.

(l) Scientific biography, the history of science and scientific institutions, etc.

8. The catalogue should embrace the following divisions:

A. General Science.
B. Mathematics.
C. Astronomy.
D. Meteorology.
E. Physics (including Astrophysics).
F. Chemistry.
G. Mineralogy.
H. Geology and Physiography.
I. Biology (including Morphology, Physiology, Systematic Botany and Zöology, Geographical Distribution of Life, Pathology, Psychophysics, etc.).
K. Anthropology (including Prehistoric Archæology, Ethnography, Comparative Technology, Folk-Lore, *Culturgeschichte*, etc.
L. Economic Science and Statistics (under determined limitations).
M. Mechanical Science and Engineering (under determined limitations).
N. Philology.
O. History, at least to the extent of including Archæology and the History of Institutions.
P. Geography (including all serious works of travel and works of reference geographically arranged).

In connection with this annual bibliography, an effort might be made to induce all persons and societies engaged in bibliographical work to adopt the same system, so that every title prepared and printed might be available for use in the universal catalogue of scientific literature, beginning with the birth of science, which, it is hoped, may in time be printed. In this connection there might be committees to advise with bibliographical workers, and whose function it would be in part to discourage duplication of work. A central office or a bulletin might be established, in which should be recorded all manuscript and published bibliographies in existence, and means provided by which persons proposing to do bibliography-work may ascertain whether the field which they intend to work in has already been covered.

No system for organizing this work has been suggested, but it is evident that if all the energy and all the money yearly expended upon the printing of partial bibliographies could be concentrated, there would be no lack of means for accomplishing very much more than has been here proposed. To secure such coöperation the proposed catalogue must meet, as fully as possible, the necessities of librarians, readers in libra-

* Book reviews and important book notices should probably be included, but whether they should be cited under the names of their authors, or parenthetically under the titles of the publications to which they relate, is a question. The latter is probably better, especially if cross references should be made under the name of the author of each review.

† It is suggested that even bibliographical appendices of importance, published in connection with books or articles, should be separately indexed, and that the annotations should indicate with precision their exact scope and character.

ries, investigators and writers, booksellers and book buyers.

It is evident, however, that existing agencies which are now engaged in bibliographical and index work should all be conciliated and enlisted in the work.

The Royal Society, the Smithsonian Institution, the special societies, such as the Zoölogical Society of London, the American Chemical Society, all groups of bibliographers engaged in the preparation of such works as the *Zeitschrift für Orientalische Bibliographie*, and the great individual bibliographers, like Professor Carus, should be brought in.

The sale of the work would undoubtedly cover the expense of printing and publishing, and it is not impossible that a considerable part of the expense of compiling might also thus be covered.

Considerable money subsidies would however be essential if the thing is to be done well.

The editorial work should doubtless be done without regard to geographical considerations, under the direction of specialized societies or institutions which should also be depositories of special information in regard to the bibliography to which they are devoted. It would be well, however, that in every country there should be a central office or depot where all the publications of that country should be systematically gathered.

It would seem also that some suitable plan should be devised for giving individual credit to the persons by whom the work is done, for there is an immense deal of self-sacrificing and conscientious work put into bibliography, and the pride of the bibliographer in having produced a thorough and workmanlike contribution in his chosen field is perhaps scarcely less than that of literary authorship.

G. BROWN GOODE.

U. S. NATIONAL MUSEUM.

SCIENTIFIC LITERATURE.

A Handbook of the Birds of Eastern North America. By FRANK M. CHAPMAN. New York, D. Appleton & Co. 1895. 12°, pp. 420. Library edition, heavy paper, broad margins. Pocket edition, thin paper, no margins, $3.00.

We live in a period of unusual productiveness in ornithological literature. We have technical works of scientific merit, popular works of literary merit, and local lists almost without end. But ornithologists and amateurs alike have long felt the need of a compact handbook small enough to be carried in the pocket, and full enough to afford means of ready identification. Another desideratum was that it should be written in language not too technical for the beginner. The older ornithologists, while recognizing the demand for such a book, have been too busy with special studies, and it has remained for one of the younger men to bring out.

Mr. Frank M. Chapman, the author of the present *Handbook*, has sought to fill the gap. He has written a book so free from technicalities as to be intelligible to a fourteen-year old boy, and so convenient and full of original information as to be indispensable to the working ornithologist. His plan is unique; his descriptions are from actual specimens (not compiled); they are written in plain English, so that no glossary is necessary, and are accompanied by numerous figures of heads, feet and tails as aids to identification. The description of each species is followed by paragraphs giving the geographic range (and the breeding range is commonly discriminated from the migratory and winter ranges); the time of presence at Washington, Long Id. [water birds], Sing Sing and Cambridge;* descriptions of the nest and eggs, and a brief popular ac-

*The data for these 4 stations are contributed respectively by Chas. W. Richmond, Wm. Dutcher, Dr. A. K. Fisher and William Brewster.

count of the habits. The latter is a special feature of the book. Many of the biographies are contributed by well-known authors and were written expressly for this work—a novel departure. Among the names signed to these articles are those of Mrs. Olive Thorne Miller, Miss Florence A. Merriam, William Brewster, Eugene P. Bicknell, Jonathan Dwight, Jr., Ernest E. Thompson and Bradford Torrey. But it would be unfair to imply that the contributed biographies, excellent as they are, are better than those of the author. Mr. Chapman is not only a naturalist of wide field experience and a close observer; he is in addition a true lover of birds, and his short sketches of the different species contain the essence of their life histories.

Another feature of the book is the keys to species. These keys have been prepared with great care, and, while not always dichotomous, are so complete as to enable the student to identify the females and young as well as the adult birds—a rare merit. A chromolithograph chart comprising 30 colors serves as a key to the terms used in describing plumages—an advantage not possessed by any other American Ornithology. The illustrations also are helpful. The text figures, more than 150 in number, will prove of great assistance. The frontispiece is a colored plate of the Bob-white or Quail in a bramble thicket, by Ernest E. Thompson. The other full-page plates are engraved half-tone reproductions of photographs. One shows the heads of 15 kinds of ducks and will be most useful. The remaining 16 are photographs of mounted birds in natural surroundings and serve to embellish the book. One of the best and most artistic shows a rail on his marsh (from a group in the American Museum).

Fifteen profusely illustrated pages are filled by the keys to the larger groups, and the figures alone should suffice to enable beginners to refer any bird to its proper family.

The systematic part of the book is prefaced by 40 pages of introduction, in which an effort is made to place the study of birds on a higher plane than that of the mere collector and student of technicalities. Mr. Chapman well says: "Birds, because of their beauty, the charm of their songs, and the ease with which they may be observed, are usually the forms of animal life which first attract the young naturalist's attention. . . . . The uninstructed beginner usually expends his energies in making a collection, for he knows no better way of pursuing his study of birds than to kill and stuff them! Collecting specimens is a step in the scientific study of birds, but ornithology would have small claim to our consideration if its possibilities ended here."

The scope of the introduction may be seen from the chapter headings: The study of ornithology; The study of birds out of doors (including bird calendars for the vicinity of New York); Collecting birds, their nests and eggs; Plan of the work (including a bird diagram, feather patterns, and so on).

It is hard to find anything worthy of serious criticism in this excellent and timely book. The use of English inches instead of millimeters is a blemish in a work of scientific value, and is less excusable since the persons who use it will be students and graduates of our schools, who are familiar with the system. We trust that in the next edition the author will not only substitute millimeters for inches and fractions, and make all the keys dichotomous, but that he will enlarge the scope of the work so as to take in the great West as well as the East—giving us a 'Handbook of the birds of America north of Mexico.'

The plan and originality of Chapman's Handbook, its copious illustrations, bountiful keys, succinct accounts of habits, convenient size and low price insure it wide popularity; while as a handbook of the

birds of eastern America it is bound to supersede all other works. It is a boon to the amateur, a convenience to the professional, and will prove a help and incentive to the study of birds. Such books are now among the greatest needs in all departments of natural history.

C. HART MERRIAM.

National Geographic Monographs, prepared under the auspices of the National Geographic Society. No. 1, Physiographic Processes; No. 2, Physiographic Features. By J. W. POWELL, late director of the United States Geological Survey. New York, American Book Company, 1895. Twenty cents a number. $1.50 a year (ten numbers).

The first two numbers of the geographic monographs, announced in SCIENCE No. 10, have lately been issued under the above titles. The series is to appear monthly during the school year, the special object of the publication being "to supply to teachers and students of geography fresh and interesting material with which to supplement the regular text-book."

A series of essays like this deserves a warm welcome from those who are interested in raising the standard of geographical teaching, and the two numbers now issued are of particular importance in several ways. They affirm, with an emphasis not hitherto given in this country, that the proper foundation of geographical study is an understanding of physiographical processes; they mark the entrance of various members of our National scientific bureaus into the work of publishing the best selections from their knowledge in essentially elementary form, with the intention of aiding teachers and scholars in our schools; they represent not simply the temporary effort of an individual, but the continued efforts of a body of experts to introduce subjects of better quality and treatment into ordinary geographical study. Such an undertaking, if successfully maintained, cannot fail to impress itself strongly all through our educational system, for, instead of appalling the reader at the outset with a large treatise of heavy cost, it continually tempts him to go further and further by the successive appearance of attractive and interesting but inexpensive pamphlets, month after month and year after year.

The publishers present the monographs in good form, well illustrated, and certainly at a very moderate price.

It is particularly interesting to receive in these two numbers the results of Major Powell's long consideration of physiographic questions. For some years his attention has been so largely given to administrative work in connection with the National Geological Survey that we have had comparatively little from his pen; but now we learn the general views that have been gradually forming during his long experience of the many aspects of geography and geology; here we find tersely presented his matured opinions on the essential elementary conceptions concerning deformation and denudation, about which our teachers are as a body so indifferent, so skeptical or so timid. Mountains are not described as the result of chaotic uplifts, but as the unconsumed remnants of broadly uplifted and deeply eroded masses. The product of long-continued denudation is not illustrated by a canyon or a valley, as so many of the text-books in current use imply, but by a broad surface of faint relief, close to baselevel. The lesson of our West that volcanic action is not so dependent on neighborhood to the sea as has been generally supposed is given perhaps too much importance; for no association of vulcanism with the ocean is mentioned. Among geologists, these announcements may not be regarded as novel, nor are they so presented; but it is certainly novel to have them addressed to teachers of geography, and to have them emphasized

as of fundamental importance to such teachers by placing them in the first two numbers of a series of geographical monographs. Much good must result from this earnest inculcation of modern physiographical principles.

The character of the two monographs may be inferred from the following outlines: The 'processes' open with an account of the three moving envelopes of the earth—air, water and rock. Their mutual interpenetration and characteristic movements are described; the more important headings being rainfall, run-off, floods; kinds of rock, structure of the rock envelope, age of rocks, interchange of land and sea; vulcanism, diastrophism and gradation. The 'features' are classified as plains and plateaus of various kinds, mountains, valleys, hills, cliffs, special forms, stream channels and cataracts, fountains, caverns, lakes, marshes, coast forms, islands. The intelligent teacher cannot fail to be interested and broadened by a careful study of these suggestive pages.

There are, however, a number of considerations which cast a shade of doubt on the plan of beginning this series of monographs with two general essays of comparatively abstract treatment. From the very nature of the case, when so small a space as thirty pages is allowed for subjects so large as 'physiographic processes' and 'physiographic features,' there can be little room saved for the introduction of concrete illustrations. Consequently, instead of inculcating physiographic process by example, it is here inculcated almost entirely by abstract generalities. Our teachers are already educated rather too much in this way; they have not enough knowledge of fact to take the best advantage of so rich a feast of generalization as is here presented. The same comment may be made on the classification of features; the broad scheme of classification here announced is of much value to the expert, who has already in mind a multitude of examples with which to fill each pigeonhole in the scheme; but it is of much less value to the school teacher, whose knowledge of geographical facts is generally very narrow, except in so far as they are concerned with empirical data, such as the position of cities, the length of rivers or the height of mountains. With features as the result of processes, teachers have heretofore had very little to do; and they can hardly now be ready to use an extended classification of land forms, few of which are made real by illustration or example. It may be doubted whether these general monographs would not have met a better appreciation two or three years hence, after other monographs had presented in detail a good number of individual features as the result of particular processes.

There is another way in which the discussion of processess and the classification of features as here given may embarrass the teacher. He may naturally expect, from the leading place of these monographs, that they are authoritative as to plan and terms, and that the latter monographs will follow the beginning thus made. But, as a matter of fact, it is at present too early in the development of the new subject of physiography to expect any one plan of description or any one scheme of terminology to gain general adoption; particularly a plan or scheme not hitherto published, not modified by expert criticism, and not generally assented to by various investigators. As a suggestion to his fellow experts, these plans of treatment from one of so wide a knowledge as Major Powell are of high value; but as formulations of method, according to which later writers of monographs should arrange their own studies, they are of unknown value, because as yet untested by repeated use and public criticism. It is highly probable that each of the later writers of the monographs will depart from the plan here presented and introduce methods and terms of his

own; so little advance has yet been made towards a general concensus of opinion in this new subject, the rational study of the forms of the land.

In its fundamental principles the classification of features proposed by Major Powell will endure, for it is based on structure and process, not on external form alone. In some other respects it does not seem acceptable, for there is a certain inconsistency and incompleteness in its terminology that is disturbing. For example, diastrophism having been defined in the first monograph as meaning upheaval or subsidence, with or without faulting or flexure, and gradation having been defined as including all processes of disintegration, transportation and deposition, we read in the second monograph that diastrophic mountains and diastrophic hills result essentially from the action of gradational processes on uplifted masses; but that diastrophic valleys, diastrophic cliffs, diastrophic cataracts and diastrophic islands result from movement alone without degradation; and no place is given to mountains of essentially constructional form, corresponding in origin to the diastrophic valleys and cliffs.

Valleys of gradation, cliffs of gradation and gradational cataracts result from processes of degradation; yet it must of course be understood that the land masses acted on by gradational processes had in these cases, as well as in the case of diastrophic mountains or hills, in some way gained an effective height above baselevel; hence it would be more consistent to call most mountains and hills 'gradational;' and thus reserve the adjective 'diastrophic' for mountains and hills made by diastrophism, like diastrophic valleys and diastrophic cliffs. Gradational islands are deposits of land waste near shore, and gradational hills are heaps of debris left directly or indirectly by glaciers; while sand dunes are given an equivalent value with gradational hills, instead of being placed with glacial hills under a general gradational heading.

Sea plains are plains of ultimate denudation with reference to the sea as the controlling baselevel; the sea plain may be enlarged by sedimentation along its margin, but no mention is made of the numerous plains resulting from the uplift of smooth sea-bottoms. Lake plains are formed with their baselevel depending on the level of lakes; lake-bottom plains, revealed by the deepening of the lake outlet ("the waters of the lake rush through the newly opened channel, and the lake is drained in whole or in part," is an unfortunate suggestion of a sudden change that must be very rare in nature), are included, but without special name, under the same heading with plains produced by denudation of the surrounding land down to lake level; and without any indication that the latter are rare and the former common.

The gradual change of opinion regarding the comparative efficacy of marine and subærial erosion gives some justification of the small share of space devoted to the processes of the seashore; but it is to be regretted that they are so disproportionately condensed. After nearly two pages about inland cliffs of gradation, sea cliffs are dismissed with less than two lines of text: "On sea coasts and lake shores, sapping is carried on by the waves, and cliffs are often produced." Floods are rather fully treated and flood plains are given about two pages, but deltas are dismissed with the briefest mention. Coast-forms in the second essay have less than two pages of the total thirty. The explicit omission of seashore features, or their postponement to a later monograph, would have been preferable to so brief a treatment.

Those who have enjoyed Major Powell's eloquent accounts of his western explorations will be glad to see again here something of the fervor of his style; but in a

few cases it has led him too far for the creation of the best impression on readers so literal-minded and so ready to accept and quote authority as teachers are. It is over-eloquent to say: "The tides sweep back and forth across the surface of the sea, and alternately lash the shores with their crested waves," or "The purple cloud is painted with dust, and the sapphire sky is adamant on wings." After all the efforts to drive 'burning mountains' out of school geographies, it is disconcerting to read here about 'floods of fire' from volcanoes. In view of the importance of the gentler processes of nature, it is unfortunate to find in the closing summary of the second essay a very figurative expression regarding the three great physiographic processes: "How fire, earthquake and flood have been involved in fashioning the land and sea." The plain-spoken teacher will have difficulty here in distinguishing between poetry and prose.

There are occasional brief or over-generalized statements that must raise unnecessary questions in the teacher's mind. In mentioning the tides, the apparent diurnal rotation of the moon around the earth is worded: 'As the moon revolves about the earth from east to west.' A little later, it is said: "The seas are heated under the tropics;" but schoolmasters are the very persons who know that the tropics and the torrid zone are not one and the same. The surface currents of the ocean are referred entirely to convectional movement in the ocean itself; no surface currents being ascribed to the winds; and it is said that "all surface currents drift eastward in going towards the poles;" although this is wide open to qualification. It is inconsistent with the teachings of modern physics to speak of the 'flow of . . . heat from the fiery globes of space.'

The corrections of small things is a vexatious matter. It is little less than a nuisance to the author to have to stop for so small a trifle as the choice between 'under the tropics' and 'within the tropics.' This distracts him from the main line of thought along which he is constructing his essay. Minute corrections call for mental characteristics that are petty in comparison with the creative ability that produces the essay itself; and from an author as independent and original as Major Powell self-correction of these relatively trifling verbal matters is hardly to be expected. Yet it will be unfortunate if the editing of the future monographs does not involve such revisions as will reduce their inconsistencies to a minimum; for when teachers discover that they can take exception to certain parts of their text, their confidence in the rest of it is weakened. They have not as a rule much sense of perspective in these matters; and, as with book-keepers, a little error is in their opinion about as dangerous as a great one. They are confirmed in this habit of thought by the character of the contests, of which they are frequent witnesses, that grow out of the rivalry of publishers and the strife of book agents. Knowing this, the best way to prevent the confirmation of the habit is to give it no opportunity for practice. Even though the personality of the author be in a measure lost, it is best to scrutinize very carefully all books intended for school teachers, and exclude from them every statement and phrase that will distract the reader from the essential line of thought and set him to differing from the author on matters of subordinate value. For this purpose an experienced book agent makes a most useful proof-reader; and his services should be secured, if possible, by those who are acting for the National Geographic Society in the supervision of these monographs. His advice will be found very serviceable to authors whose previous practice in writing has been on essays for scientific journals and governmental reports.

Harvard University. W. M. Davis.

Butterflies and Moths (British). By W. FURNEAUX. London, Longmans. 1894. 12°.

This is by no means a complete treatise on these insects, which would be quite impossible in the 350 pages to which it is limited; but rather a selection has been made of such as the author thinks would prove most desirable. The number of British butterflies, however, is so limited (66 species) that place is found for all of them. A brief description and general account is given of each species mentioned, together with a figure of most of them; a certain amount of attention is paid to the early stages and especially to the caterpillar; but the book is very weak indeed on all points as to classification, the common characters of groups being hardly hinted at; it is therefore intended almost exclusively for the amateur, and not for the serious student. The introduction, which occupies about a third of the book, and is of as much interest to an outsider as to a Briton, is exceptionally good for a work of this class, though here again it is lean as regards all matters of structure or classification. The illustrations in the text, and they are numerous, are with few exceptions unusually good; those on the twelve colored plates not so good. The figure of the egg of *Pieris brassicæ*, on p. 14, is upside down.

S. H. S.

The Pygmies. By A. DE QUARTREFAGES. Translated by FREDERICK STARR. Illustrated. Pp. 255. D. Appleton & Co. 1895.

This volume forms number 2 of the Anthropological Series, edited by Professor Starr, of the University of Chicago. The original appeared in Paris about eight years ago, and the name of the distinguished author, as well as the interest of the subject, insured it considerable attention.

He approaches the topic historically with a chapter on the accounts of the pygmies which are found in classical writings, and an attempt to analyze them in the light of modern research. Turning to later sources, a full history is supplied of what was known ten years ago of the dwarf tribes of Melanesia, of the Mincopies of the Andaman islands, of the Negritos of Indonesia, of the Negrillos of Central Africa, and of the Hottentots and Bushmen of the southern portions of that continent. Special attention is given to the physical peculiarities of the tribes mentioned and to their sociologic condition. A chapter of some length is devoted to the religious beliefs of the Bushmen and Hottentots, successfully controverting the statement often advanced that these humble peoples had no religion at all. The illustrations, thirty-one in number, are fairly well done, though printed rather carelessly. The translator has accomplished his task well, and the text reads pleasantly.

It is to be regretted that the large material accumulated in the last ten years on this subject was not more freely called upon. Mr. Haliburton, Professor Kollman and Dr. Virchow have contributed monographs which should not be overlooked. Emin Bey's anthropometric reports on the Negrillos are the best we have; but these names are not referred to. We should have liked, also, a chapter on the causes which bring about decrease in stature, a physiological study of its etiology. Probably any people would become dwarfs under given conditions, and the trait is therefore not a racial one. D. G. BRINTON.

An Introduction to Structural Botany (Flowering Plants). By D. H. SCOTT. London and New York, Macmillan & Co. 288 pp. 113 figs. $1.00.

The author intends that this shall be a book for beginners. Three types are chosen to illustrate the structure of the flowering plants, the wall flower (*Cheiranthus Cheiri*

L.); the white lily (*Lilium candidum* L.); and the Spruce fir (*Picea excelsa* Link). He has also introduced a chapter of 32 pages on the 'physiology of nutrition.' The language of the book is exceedingly simple. Some of the original figures are very good. In general it may be stated that the subject-matter is well treated. The author intends at some future time to present in a similar way the cryptogamic types.

The fact that the author begins the study of structural botany with the highest types will be objected to by most modern botanists. Many will also question the advisability of attempting to present structural botany in an elementary way.

Albert Schneider.

NOTES AND NEWS.

ARGON.

M. Berthelot has communicated to the Academy of Sciences the fuller details which he promised concerniug his experiments upon argon. Towards the end of February he received from Professor Ramsay 37 cubic centimètres of the gas, with which small quantity he has obtained positive results of the greatest interest. Following the process by which he formerly effected the direct combination of nitrogen with various organic compounds, he finds that argon is equally absorbed by these bodies, though apparently with somewhat less facility. The action of the silent discharge upon a mixture of argon and benzene vapor is accompanied by a feeble violet luminosity visible in the dark. In one of five experiments he found that a fluorescent substance was produced, which developed a magnificent greenish light and a peculiar spectrum. M. Berthelot took 100 volumes of Professor Ramsay's gas, added a drop or two of the hydrocarbon, and exposed the mixture to the silent discharge at moderate tension for about ten hours. The excess of benzene vapor being removed in the usual way, the mixture was found to have been reduced to 89 volumes. More benzene was then added, and the experiment was repeated with higher tension, which in three hours produced a reduction of volume equal to 25 per cent. On again submitting the gaseous residue with benzene to very high tension discharge he found the final result to be 32 volumes. Analysis showed this residue to contain only 17 volumes of argon, the other 15 volumes being hydrogen, free or combined, and benzene vapor. In other words, M. Berthelot has effected the combination of 83 per cent. of the argon under experiment, and was prevented only by the dimensions of his apparatus from carrying the condensation yet further.

The quantity at his disposal was too small to permit of complete examination of its products, but he is able to say that they resemble those produced when nitrogen mixed with benzene is submitted to the silent discharge. That is to say, they consist of a yellow resinous matter condensed on the surface of the glass tubes employed. This matter on being heated decomposes, forming volatile products and a carbonaceous residue. The volatile products restore the color of reddened litmus paper, proving the production of alkali by the decomposition, though the quantity of matter at command was too small to allow of its nature being demonstrated. In any case, M. Berthelot concludes, the conditions in which argon is condensed by hydrocarbons tend to assimilate it yet more closely with nitrogen.

He adds that if it were permitted to assume 42 instead of 40 as the molecular weight of argon—an assumption which the limits of error in the experiments hitherto made do not, in his opinion, exclude—this weight would represent one and a half times that of nitrogen; in other words, argon

would stand to nitrogen in the same relation as ozone to oxygen. There is, however, the fundamental difference that argon and nitrogen are not transformable into one another, any more than the isomeric or polymeric metals. Without insisting upon points which are still conjectural, M. Berthelot observes that in any case he has demonstrated that the inactivity of argon disappears in the conditions he describes. When the gas can be obtained in considerable quantities, he says it will be easy by ordinary chemical methods to take these primary combinations, or their analogues obtainable with oxygen, hydrogen, or water, as a point of departure for the preparation of the normal series of more simple compounds.—*London Times.*

AT the anniversary meeting of the Chemical Society, Professor Ramsay stated that he had examined the gas (which according to an observation of Hillebrand's was nitrogen) given off by the mineral clevite when treated with sulphuric acid, and discovered that it contained argon. Spectroscopic examination showed a very bright yellow line nearly coincident with the yellow sodium line. This line was found to be identical in position with the yellow line observed in the spectrum of the sun's chromosphere, and attributed to the hypothetical element helium. Whether helium could be separated from argon remained to be seen. Mr. Crookes gave some additional particulars of the spectrum of the gas from clevite. He found certain coincidences with the band spectrum of nitrogen, particularly in the ultra violet region, but some lines were present which were not found in the nitrogen spectrum, and *vice versa.*

DR. B. BRAUNER, Professor of Chemistry in the Bohemian University, Prague, has written to *Nature*, suggesting that argon possibly exists in nebulæ. He points out that a strong argon line, measured by Mr. Crookes, has practically the same wavelength as the chief nebula line, and thinks that the line at λ 3729.8 in the 'blue' spectrum of the new substance represents the line at λ 3730, found in the spectra of nebulæ and white stars.

PALEONTOLOGY.

PROFESSOR H. J. SEELEY has recently published a paper in the *Philosophical Transactions* upon *The Reputed Mammals from the Karroo Formation of Cape Colony*, in which he reconsiders the evidence as to the mammalian nature of Theriodesmus and of Tritylodon. He established the former genus some years ago upon a fore-arm; the latter was established by Richard Owen in 1884, upon a skull. In his previous papers the author has described both of these types as mammalian, and the skull has invariably been placed with the mesozoic Monotremes, owing to the resemblances which its teeth present, both in the crown and in the multiple fangs, to other mammals of this very ancient and widespread group of multituberculates. Professor Seeley, in his renewed examination of the skull of Tritylodon, believes that he finds evidences of 'post-frontal' and 'pre-frontal,' and possibly of a 'transverse' bone, as in the Theriodont reptiles. This evidence he considers overweighs the distinctively mammalian characters of the teeth. If it is subsequently confirmed by more satisfactory material this will be another example of the independent development of what we have always considered distinctively mammalian characters within the reptilian class. Another remarkable species of an undoubted reptile is the *Diademodon tetragonus*, in which the single-fanged or reptilian molar teeth are capped with crowns which bear a most striking resemblance to a low-crowned quadritubercular mammalian molar. These discoveries in the Karroo Formation promise to yield most interesting and surprising results, although if the position here taken

is correct, it is somewhat disappointing to have such a type as Tritylodon taken from the class mammalia. The evidence does not seem to be conclusive.

SIR WILLIAM DAWSON.

At the last regular monthly meeting of the Montreal Natural History Society (26th ult.), Sir J. William Dawson read a paper on the skeleton of a 'white whale' (*Beluga*), recently found in a brickyard off the Papineau Road, Montreal. The specimen, which was imbedded in the Leda clay, belongs to a species once abundant, and still not at all uncommon, in the lower St. Lawrence. Though it is now rarely known to ascend the river to fresh water, a stuffed specimen in the museum of the N. H. Society is said to have been caught near Montreal. The fossil was below the normal length, being about 12 feet.

Since his retirement from the principalship of McGill University, Sir William Dawson has turned his larger leisure to good account. Besides three important works issued from the press during the last two years, he has found time for special courses of lectures and an unfailing succession of papers on a wide range of subjects. Just forty years ago he entered on his task of building up McGill College. The status of the university when his supervision ceased, in 1893, is one of the things on which Canadian science may well congratulate itself. J. T. C.

GENERAL.

The Niles bill incorporating the New York Zoölogical Society, and providing for the establishment of a zoölogical garden, has been passed by the Senate at Albany.

D. Appleton & Co. announce a *Criminology Series* edited by Mr. Douglas Morrison, the first volume of which, *The Female Offender*, by Professor C. Lombroso, will be issued this month.

The *Academische Revue* is a new journal edited by Dr. Paul Von Salvisberg and published by the International Hochschulwesen in Munich. In addition to original articles on educational interests it proposes to publish academic news, and the editor will be glad to have items of news sent to him.

The building used as a school of manual training by the New York Institution for the Instruction of the Deaf and Dumb, at One Hundred and Sixty-fifth Street and Fort Washington Avenue, was burned on April 8th, causing a loss of $40,000. The building stood about 400 feet from the main buildings of the institution.

At a meeting on March 28th, the Court of St. Andrew's University decided to found two medical chairs, the one of materia medica and the other of anatomy.

Macmillan & Co. have in press a translation, by Dr Charles R. Eastman, of Prof. Karl von Zittel's 'Elements of Paleontology.'

Dr. Thomas M. Drown, now Professor of Chemistry in the Massachusetts Institute of Technology, has been elected President of Lehigh University.

Luigi Ferri, Professor of Philosophy in the University of Rome, died recently at the age of 68.

Dr. G. Glogau, Professor of Philosophy in the University of Kiel, died recently in Greece at the age of 50.

Professors Erman, E. Schmidt and Stumpf, of the University of Berlin, have been elected members of the Prussian Academy of Sciences.

The British Government spent in 1894 £4,802 on the destruction of locusts in Cyprus. The methods used were the collection of eggs during the summer and winter and the purchase of live locusts by weight in spring.

The following lectures will be given before the Royal Institution, of London, after Easter: Professor George Forbes, three lectures on 'Alternating and Interrupted

Electric Currents'; Professor E. Ray Lankester, four lectures on 'Thirty Years' Progress in Biological Science'; Professor Dewar, four lectures on 'The Liquefaction of Gases'; Dr. William Huggins, three lectures on 'The Instruments and Methods of Spectroscopic Astronomy.'

SOCIETIES AND ACADEMIES.

ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

AT the meeting on March 26th Dr. M. V. Ball called attention to the microscopic preparation of the germ characteristic of erysipelas, the botanical name of which is *Streptococcus pyogenes*. The culture of the organism had been used with most gratifying success in the treatment of cancer, the cure of some cases having been reported, while others had been manifestly benefited. A subcutaneous injection of the culture raises the temperature to 104° in 20 minutes. This palliative effect of the poison of erysipelas had long been known, the improvement of cancer cases accidentally affected having been noticed years ago in hospitals.

Dr. S. G. Dixon spoke of the morphological resemblance between *Actinomyces*, or the ray fungus, and *Ægerita candida*, a white fungus, found growing on damp decaying wood. The former is believed to produce in cattle and man the disease known as lump jaw, or *Actinomyces*. Should the two fungi prove to be identical, the hitherto unknown cause of lump jaw in cattle would not only be explained, but cattle breeders would be enabled to prevent, to a great extent, the much dreaded disease.

Mr. Henry C. Pilsbry exhibited fine specimens of the genus *Cerion*, and called special attention to the variations of the teeth or plates on the collumella, some of which extended far into the shell, while in other individuals they are quite superficial, the external characters, however, remaining the same. He believed the use of these folds was to enable the mollusk to keep a more firm grasp of the shell, and thus move it about more freely, as it hangs from twigs and leaves.

The geographical distribution of the species is peculiar. They inhabit Cuba, Hayti, the Bahamas and Florida Keys and reappear in Curacoa, off the northern coast of South America, but are completely absent from Jamaica and the Caribbean chain. There is, therefore, a wide gap between the northern and southern areas inhabited by the genus *Cerion*, although the islands in this space are apparently favorable to the existence of snails. A suite of specimens illustrating species of *Cerion* was exhibited.

EDW. J. NOLAN, *Recording Secretary.*

NEW YORK ACADEMY OF SCIENCES.

AT the meeting of the Section of Astronomy and Physics of the New York Academy of Sciences on April 1st Professor R. S. Woodward was elected chairman and William Hallock secretary for the following year.

President Rees gave a very interesting resumé of the work done in astronomy during 1894. This paper may appear in SCIENCE a little later.

President Rees then showed some of Professor Barnard's wonderful photographs of the Milky-Way, pointing out the evidences of the peculiar geometrical clustering of the stars in certain parts, as well as the 'dark lanes' and 'star streams' discovered by Barnard. He also showed photographs of several comets, especially Brooks', which went through such interesting changes. The photographs brought out most beautifully the unusual structure of the tail, and the sudden changes in shape, especially when it seemed to have encountered a resisting medium and apparently broke the tail near its middle.

The pictures were discussed and admired

by the members. Mr. C. A. Post admitted that his skepticism as to 'star streams' had been conquered, and argued that from the photograph it seemed more probable that Brooks' comet had run its head against the obstacle rather than its tail, as maintained by Professor Barnard.

WM. HALLOCK, *Sec'y of Section.*

THE TEXAS ACADEMY OF SCIENCE, APRIL 5.

Brief announcement of my recent discoveries in the mathematics of engineering: DR. G. B. HALSTED.

The storm-water storage system of irrigation: ROBERT A. THOMPSON.

Cometary Orbits as related to the solar system: CHARLES K. MCDONALD.

Microscopic exhibition of slides sent by Dr. A. J. Smith on the organism which causes malarial fever: W. W. NORMAN.

SCIENTIFIC JOURNALS.

AMERICAN JOURNAL OF MATHEMATICS, APRIL.

A Method for Calculating Simultaneously all the Roots of an Equation: EMORY MCCLINTOCK.

Sur le logarithme de la fonction gamma: CH. HERMITE.

Sur la pression dans les mileux diélectriques ou magnétiques: P. DUHEM.

On Ternary Substitution-Groups of Finite Order which leave a Triangular unchanged: H. MASCHKE.

PSYCHE, APRIL.

A Comparison of Colias hecla with Colias meadii and Colias elis: THOMAS E. BEAN.

Western Pediciæ, Bittacomorphæ and Trichocerœ: C. R. OSTEN SACKEN.

Failure to emerge of Actias luna: CAROLINE G. SOULE.

Entomological Notes.

JOURNAL OF GEOLOGY, FEB.–MARCH.

Sedimentary Measurement of Cretaceous Time: G. K. GILBERT.

Use of the Aneroid Barometer in Geological Surveying: C. W. ROLFE.

A Petrographical Sketch of Ægina and Methana: Part III. HENRY S. WASHINGTON.

On Clinton Conglomerates and Wave Marks in Ohio and Kentucky (Concluded): AUG. F. FOERSTE.

Glacial Studies in Greenland: T. C. CHAMBERLIN.

Editorials; Publications.

BULLETIN OF THE TORREY BOTANICAL CLUB. APRIL.

Biographical Sketch of Dr. J. Bernard Brinton (with portrait): By a Committee of the Philadelphia Botanical Club.

Food Plants of the North American Indians: V. HARVARD.

The Classification of the Archegoniates: LUCIEN M. UNDERWOOD.

Rules for Citation adopted by the Madison Botanical Congress and Section G., A. A. A. S.

Proceedings of the Club.

Index to Recent Literature Relating to American Botany

NEW BOOKS.

The Story of the Stars. G. F. CHAMBERS. New York, D. Appleton. 1895. Pp. 160.

Evolution and Effort. Edmond Kelly. New York, D. Appleton, & Co. 1885. Pp. vii+297. $1.25.

A Primer of Evolution. Edward Clodd. New York and London, Longmans, Green & Co. 1895. Pp. 186.

Repetitorum der Chemie. CARL ARNOLD. 6th Ed. Hamburg und Leipzig, Leopold Voss. 1894. Pp. x + 613. M. 6.

Anleitung zur Mikrochemischen Analyse. H. BEHRENS. Hamburg und Leipzig, Leopold Voss. 1895. Pp. xi + 224. M. 6.

Bildungselemente und Erziehlicher Wert des Unterrichts in der Chemie. RUDOLPH ARENDO. Hamburg und Leipzig, Leopold Voss. 1895. Pp. 103. M. 2.

Le Petrole. A. JACCARD. Paris, Felix Alcan. 1895. Pp. xii + 292.